

A Study on the *Ichthyofaunal* Status of an Oxbow Lake of Eastern Himalayan River of Assam, India

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Abstract

The status of fish fauna of Kalpani beel in the Chirang district of Assam was studied from June to December, 2016. It is an ecologically important oxbow lake. The beel is fed by flood of Manas River originating from Bhutan and an important tributary of the river Brahmaputra. A total of 55 fish species belonging to 38 genera and 21 families (under 7 order) has been recorded during the study period from the lake. Out of these, 1.81% are endangered (EN), 3.63% are vulnerable (VU), 9.09% are near threatened (NT), 78.18% are least concern (LC), 1.81% are data deficient (DD) and 5.45% are not evaluated (NE). The highest no. of species is represented by cyprinidae family (22) followed by channidae (5), Bagridae (3), Mastacembelidae (3), osphronemidae (2), cobitidae (2), Ambassisidae (2), Nemacheilidae, Anabantidae, Badidae, Gobiidae, Nandidae, Notopteridae, Claridae, Heteropneustidae, Shilbeidae, Shilbeidae, Siluridae, Synbranchidae, Belonidae and Tetradontidae (1). The present paper deals with a list of ichthyofauna, collection locality, scientific name, local name based on their locality and their conservation status as per IUCN status.

Keywords: Eastern Himalayan river, ichthyofaunal diversity, Kalpani beel, oxbow lake

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INTRODUCTION

The fishes are the main biotic components of the aquatic ecosystem relating to man [1]. It is an important source of both food and income to many people in developing countries [2]. About 75% of the world populations are directly or indirectly dependent on fish for their protein food, containing 16 to 24% proteins [3, 4]. All total 21,723 living species of fish have been recorded out of 39,900 species of vertebrates. Out of these, 8,411 are fresh water species and 11,650 are marine [5]. In India, there are 2,500 species of fishes, of which, 930 are freshwater and 1,570 are marine [6].

India is rich in biodiversity and is one of the 12 'Mega Diversity' centers of the world. It also has two of the 25 recognized biodiversity 'hot spots' of the World-Eastern Himalayas and Western Ghats [7]. The Ministry of Environment and Forests, Government of India (2000) records 47,000 species of plants and 81,000 species of animals which is about 7 and 6.5% respectively of global flora and fauna, includes 2546 species of fishes [8]. Fisheries sector contributed 1.04% in total GDP (at current price in February, 2018) and

5.34% in agriculture and allied activities GDP. It is reported that the country earned approximately Rs. 33,441.61 crore (\$ 5511.12 million) by exporting fish and fishery products during 2014–15. The annual requirement of fish in our country is 9.0 million tons as against the annual production of 1.5 million tons [9].

The North-East India is considered as one of the hotspots of fresh water fish diversity in the world by the world conservation monitoring centre [10, 11]. It was listed with 197 potential food, sports and aquarium fish species belonging to 27 families under 74 genera [12]. The National Bureau of Fish Genetic Resources (NBFGR, ICAR), Lucknow, in 1992 had indentified nine endemic fishes of North-Eastern region as most threatened [11]. There has been a wide variation in the number of fishes reported from this region ranging from 172 to 267 [13, 14]. It was reported that so far, 172 fish species have been recorded from the entire North Eastern region, of which, 33 representatives endemic to their distribution of this region. Over the years, the rich fish fauna has been tremendously degraded [11]. It has rich fresh water systems like river,

streams, tanks, lakes (locally called as *beel*) and reservoir.

Assam, is a part of a global biodiversity hotspot [15]. The state is situated in between 24°08'10"N and 27°58'15"N latitudes and 89°42'05"E and 96°01'14"E longitudes [16]. A total 861 numbers of oxbow lakes are observed throughout the state of Assam, covering an area of 15460.60 ha, which constitutes 0.20% of total geographical area of the state and 15.27% of the total area under wetlands [17]. Assam contains the Brahmaputra and the Barack river systems including their numerous tributaries (combined length being about 4820 km), a large number of flood plain wetlands (*beels*) and swamps (1.12 lakh ha) [11]. So it has huge potential for fishery resources, so far, 185 species have been recorded [11]. Francis Hamilton (1808–1814) made a detailed survey on fish fauna of eastern provinces including Assam. Robinson (1841) put forward a comprehensive note on Assam and recorded 74 fish species from the province. Beaven (1877) published “Hand book of fresh water fishes of India” which contains short description of almost 417 fresh water fish species; of which, 46 species were from the province of Assam [18]. Here, so far 185 species belonging to 98 genera under 34 families have been recorded. This group has 33 representatives endemic to the region. There may be many more fish species which are yet to be recorded owing to remoteness of the region. Based on the random field surveys conducted during 1996–98 and available literature, 25 fishes have been identified as threatened species facing dangers at various levels. The tentative check-list includes four endangered species, eight vulnerable, four rare etc.; the state also harbors several important ornamental fishes [11]. According to the Directorate of Fisheries, Assam (1997–98), there are 1196 *beels* in Assam; of which, 430 are registered while the remaining 766 are unregistered. The areas covered by the registered and unregistered *beels* are 60,250.24 and 40,603.37 ha respectively [19]. The annual requirement/demand of fish in Assam is over 3.25 lakh metric tons and the state's production is 2.94 lakh metric tons [20]. This diversity of rich fish germplasm in Assam has been fast undergoing anthropogenic and

natural stresses like habitat destruction, over exploitation and aquatic pollution leading to depletion of these resources.

However, no substantial work was available on the fish status of Kalpani *beel* (locally known as “Mora manas”) of Assam. It is ecologically suitable as breeding ground of the river fishes and suitable habitat for aquatic flora and fauna and the production of fishes as well [21]. The present study has been carried out with an objective to know the status of *ichthyofaunistic* resources of the *beel*.

MATERIALS AND METHODS

The study was conducted in the Kalpani *beel* (latitude 26°54'80" to 26°55'03"N and longitude 90°80'82" to 90°82'67"E) of Chirang district of Assam, during June to December, 2016; total area of the *beel* is 56.1655 ha (Figure 1). The *beel* is connected with the river Manas, a tributary of river Brahmaputra.

The study on fish species of the *beel* was conducted by collected data of captured fishes. Collection of fishes was done with the help of fishermen during the time of fishing. The market survey was conducted in the morning during 8.00 to 11.00 AM and evening during 3.00 to 6.00 PM, at the nearest markets of the *beel* site. The photographs of the fish species were captured with the help of digital camera (Sony DSC-W 830/PCE 32) for registering the specimens. Secondary data were also collected through observation and interaction with local people and fishermen communities of the areas.

The collected fish samples were preserved individually in 8% formalin for detailed examination and identification. The fish samples were taxonomically identified with the help of experts from Zoological survey of India (ZSI), Shillong, and using standard literature [12, 18, 22, 23]. Information on local name was obtained from Mahaldar and fishermen. The present status of identified fishes was determined using the categories given by IUCN, 2011 for threatened fish [24, 25].

RESULTS AND DISCUSSION

The collected fish species including their order, family, scientific name, local name and conservation status (IUCN) are depicted in the

Table 1. The fish nomenclature is based on the expert from ZSI, Shillong and standard literature available and fish status was checked the IUCN red list (IUCN, 2011). The number and percent composition of families, genera

and species under various order is presented in Table 2. Percentage occurrence of fishes under the conservation statuses is tabulated in Table 3 and shown in Figure 2.

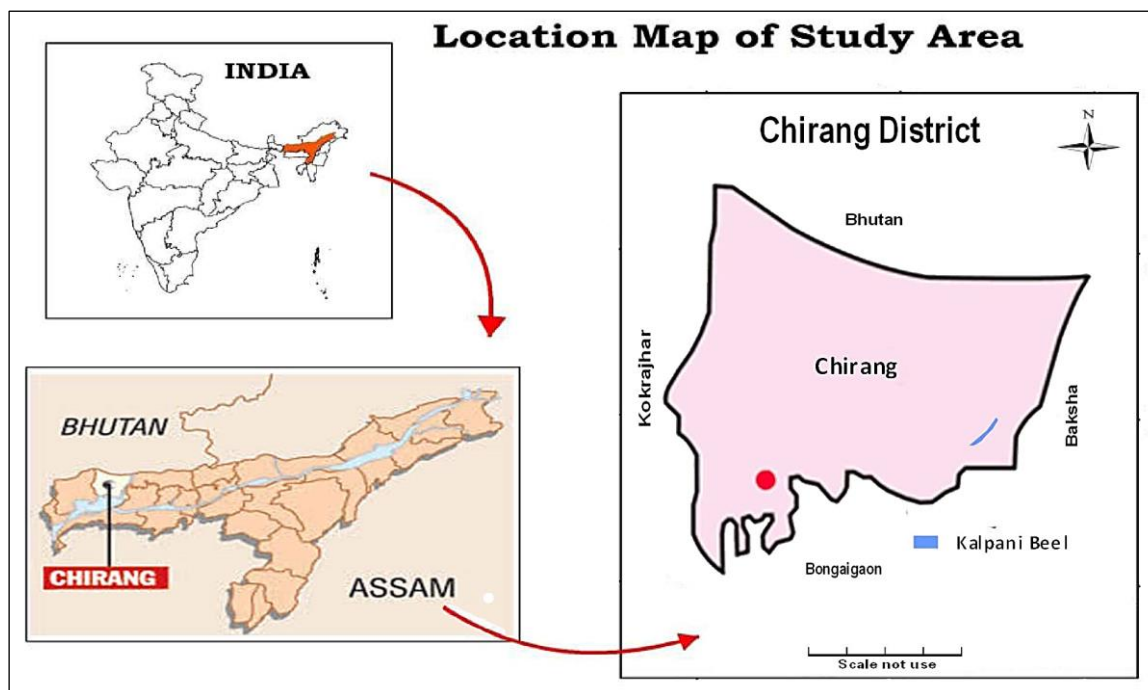


Fig. 1: Map Showing the Location of the Study Sites of the Chirang District of Assam, India.

Table 1: List of Fish Species of Kalpani Beel and Their Conservation Statues.

Order	Family	Sl. No.	Scientific Name	Local Name	IUCN Status
Cypriniformes	Cyprinidae	1	<i>Amblyphayngodon mola</i>	Moa	LC
		2	<i>Crrhinus reba</i>	Lachim	LC
		3	<i>Catla catla</i>	Bahu	VU
		4	<i>Chela labuca</i>	Laupeta	LC
		5	<i>C. atpar</i>	Silkani	NE
		6	<i>Cirrhinus mrigala</i>	Mirika	LC
		7	<i>Cyprinus carpio</i>	Common carp	VU
		8	<i>Chagunius chagunio</i>	Pitkata	LC
		9	<i>Ctenopharyngodon idella</i>	Grass carp	NE
		10	<i>Carra annadalei</i>	Ghor Poia	LC
		11	<i>Gonorhynchus latius</i>	Lahari	LC
		12	<i>Hypophthalmichthys molitrix</i>	Silver carp	NT
		13	<i>Labeo bata</i>	Bata	LC
		14	<i>L. boga</i>	Bhangon	LC
		15	<i>L. rohita</i>	Rou	LC
		16	<i>L. gonius</i>	Kurhi	LC
		17	<i>L. calbasu</i>	Baus	LC
		18	<i>Osteobrama cotio</i>	Baralia	LC
		19	<i>Puntinus chola</i>	Puthi	LC
		20	<i>P. terio</i>	Puthi	LC

		21	<i>P. sophore</i>	Puthi	LC
		22	<i>P. sarana</i>	Cheniputhi	LC
		23	<i>Esomus danricus</i>	Dorikona	LC
	Cobitidae	24	<i>Acantopsis Choirorhynchos</i>	Botia	LC
		25	<i>Lepidocephalichthys guntea</i>	Botia	LC
	Nemacheilidae	26	<i>Acanthocobitis botia</i>	Kukurbotia	LC
Perciformes	Ambassisidae	27	<i>Parambassis baculis</i>	Chanda	LC
		28	<i>P. lala</i>	Chanda	NT
	Anabantidae	29	<i>Anabas testudineus</i>	Koi	DD
	Badidae	30	<i>Badis badis</i>	Vacheli	LC
	Belontiidae	31	<i>Colisa sota</i>	Besa	NT
		32	<i>C. fasciatus</i>	Kholihona	NT
	Channidae	33	<i>Channa striata</i>	Sol	LC
		34	<i>C. Punctatus</i>	Goroi	LC
		35	<i>C. marulins</i>	Sal	LC
		36	<i>C. gachua</i>	Chengeli	LC
		37	<i>C. stewartii</i>	Garka chang	LC
	Gobiidae	38	<i>Glossogobius giuris</i>	Patimutura	NE
	Nandidae	39	<i>Nandus nandus</i>	Ghaghshi	LC
	Osphronemidae	40	<i>Trichogaster fasciata</i>	Khalihona	LC
		41	<i>T. lalius</i>	Lal kholihona	LC
Osteoglossiformes	Notopteridae	42	<i>Notopterus notopterus</i>	Kanduli/Pholi	LC
Siluriformes	Bagridae	43	<i>Sperata seenghala</i>	Ari	LC
		44	<i>Mystus cavasius</i>	Tangana	LC
		45	<i>M. carcio</i>	Tangana	LC
	Claridas	46	<i>Claries batrachus</i>	Magur	EN
	Hetaropneustidae	47	<i>Heteropneustes fossilis</i>	Singhi	LC
	Shilbeidae	48	<i>Pachypterus atherineodes</i>	Bardia	LC
	Siluridae	49	<i>Wallago attu</i>	Barali	NT
Synbranchiformes	Mastacembelidae	50	<i>Mastacembelus armatus</i>	Bami	LC
		51	<i>Macrognathus aral</i>	Gorsi/Turi	LC
		52	<i>M. Pancalus</i>	Turi	LC
	Synbranchidae	53	<i>Monopterusuchia</i>	Cuchia	LC
Syprinodoniformes	Belonidae	54	<i>Xenentodon cancula</i>	Kokila	LC
Tetradontiformes	Tetradontidae	55	<i>Tetradon cutcutia</i>	Gangatop/Tepa	LC

Note: Abbreviations used in the table are: EN: Endangered, Vu: Vulnerable, NT: Near Threatened, LC: Least Concern, LR: Lower Risk, DD: Data Deficient and NE: Not Evaluated.

Table 2: Number and Percent Composition of Families, Genera and Species under Various Orders.

Sl. No.	Order	Families	Genera	Species	% of Families in an Order	% of Genera in an Order	% of Species in an Order
1.	Cypriniformes	3	18	26	14.28	47.36	47.27
2.	Perciformes	8	08	15	38.09	21.05	27.27
3.	Osteoglossiformes	1	01	01	04.76	02.63	01.81
4.	Siluriformes	5	06	07	23.80	15.78	12.72
5.	Synbranchiformes	2	03	04	09.52	07.89	07.27
6.	Syprinodoniformes	1	01	01	04.76	02.63	01.81
7.	Tetradontiformes	1	01	01	04.76	02.63	01.81
	Total	21	38	55			

Table 3: Percentage Occurrence of Fishes of Kalpani beel under the Conservation Status IUCN (2011).

	EN	VU	NT	LC	LR	DD	NE
Number of species	1	2	5	43	0	1	3
Percent Contribution	01.81%	03.63%	9.09%	78.18%	0%	1.81%	5.45%

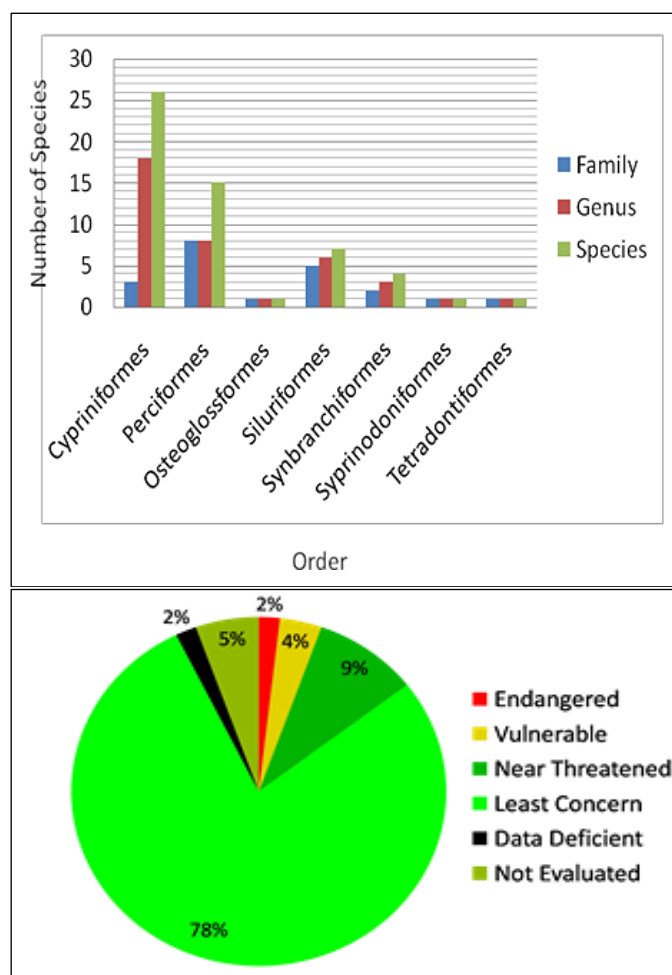


Fig. 2: (1): Number of Families, Genera and Species under Various Orders; and (2) Pi Diagram Showing the Percentage of Species under Various Threat Categories as per IUCN Status.

A total of 55 species belonging to 38 genera, 21 families and 7 orders have been recorded from the Kalpani beel during the study period. The fish fauna of the beel belongs to the following order: *Cypriniformes*, *perciformes*, *Osteoglossiformes*, *Siluriformes*, *Synbranchiformes*, *Syprinodoniformes*, *Tetradontiformes*. In our investigation, order *Cypriniformes* was the most dominant group representing 26 species, followed by *perciformes* with 15 species, *Siluriformes* with 7 species, *synbranchiformes* with 4 species, *Osteoglossiformes*, *Syprinodoniformes* and *Tetradontiformes* each with 1 species. Out of

21 families, order *perciformes* contributes 8 (38.09%) families followed by *Siluriformes* 5 (23.80%), *Cypriniformes* 3 (14.28%), *Synbranchiformes* 2 (9.52%) and *Osteoglossiformes*, *Syprinodoniformes* and *Tetradontiformes* with 1 (4.76%) family. However, family *cyprinidae* dominates the catch list with 23 species, followed by 5 species of *Channidae*, *Bagridae* and *Mastacembelidae* families with 3 species, whereas, families *Cobitidae*, *Ambassisidae*, *Belontiidae* and *Osphronemidae* are represented by 2 and remaining 13 families contained single species.

Present study recorded the presence of one (1) endangered species (*Clarias batrachus*) and five (5) near threatened species (*Hypophthalmichthys molitrix*, *Parambassis lala*, *Colisa sota*, *C. fasciatus* and *wallago attu*) which is one of the important findings. Presence of *Colisa* species is significant for this *beel* and this is placed in near threatened category in IUCN [2011]. Of these two (2) vulnerable species (*Catla catla*, *Cyprinus carpio*), 43 least concern species and 3 (three) not evaluated species are recorded (Figure 3).

CONCLUSION

The Kalpani *beel* hosts a number of fresh water fish species including globally threatened species. It is ecologically suitable as breeding ground of the river fishes. Therefore, it is suitable habitat for aquatic flora and fauna and the production of fishers

as well. The fish species of the *beel* are under constant threat due to several anthropogenic factors. Fishing here is a tradition rather than commerce, considerable proportion of rural people is meeting their daily requirements of fish from the *beel*. The Kalpani *beel* provides huge scope of fish production and local people depend on it for their livelihood. Over fishing occurs due to high fish prized species. Community fishing in the *beel* should be prohibited. It is illegal under the wild life (protection) Act. 1972. Since the fish fauna in this region supports the livelihood of several economic classes of population, there is an urgent need to understand the conservation strategies for protection of the natural habitat. Experts believe that scientific management of the *beels* may double the fish yield per hectare, which is quite low than the need.

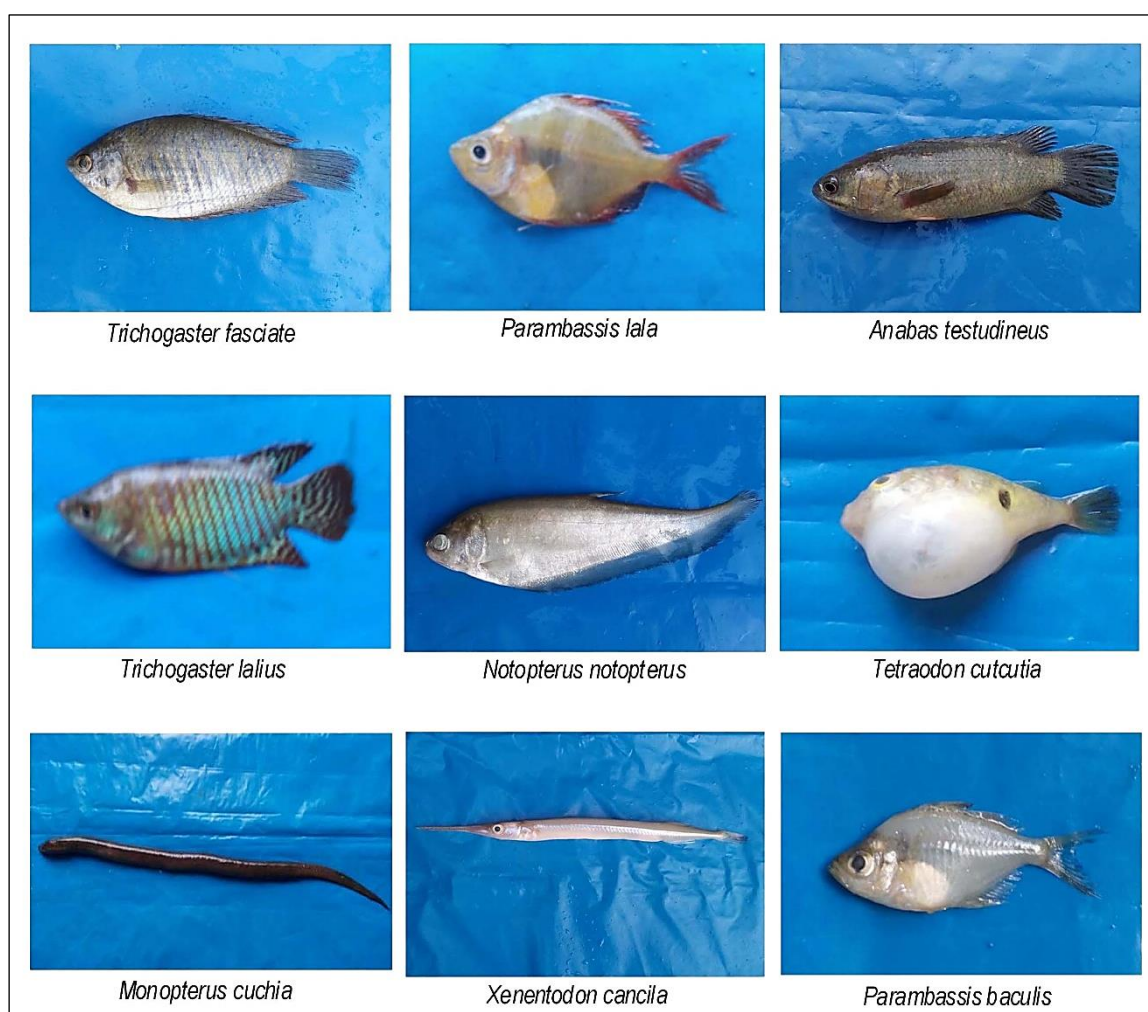


Fig. 3: Few Important Fish Species of the Study Area.

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